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(54) Egg cooking apparatus and method.

(57) An automatic egg product cooking apparatus that fills three-piece moulds (30,32,34) with a uniform amount of egg material. The moulds undergo slow, low temperature cooking and the cooked egg product is thereafter dumped and the mould cleaned. The apparatus and method is used to produce a cooked egg product having a uniform volume, and which may vary the cholesterol level while maintaining the size of the product.

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Description

EGG COOKING APPARATUS AND METHOD

The present invention relates to the cooking of eggs, and more particularly to apparatus and methods for cooking eggs in an automated process that retains the oval egg-shape during cooking.

Eggs have long been cooked or prepared individually by consumers using a wide variety of methods. Among these are methods of preparation and cooking which retain the oval shape of the egg, such as by boiling the egg in the shell. Another conventional method is the cooking of eggs in egg coddlers, which provide crucible-like cooking enclosures that may or may not be egg-shaped. An egg is cracked open and emptied into the coddler, and other ingredients may optionally be mixed with the egg in the coddler. The egg coddler is then placed in boiling water in order to cook the contents.

At least one apparatus for the automated cooking of an egg product has been developed. However, such apparatus does not produce an egg-shaped oval egg product but rather a cylindrical tube of cooked egg product. These egg-product cylinders are typically sliced for use by a commercial food service or restaurant, such as in salads or the like. These cylindrical egg products cannot be used in place of natural eggs however when the entire or a major portion of the egg is to be used whole by the consumer. These cylindrical egg products typically include an outer tube of egg white with an inner cylinder of egg yolk. The apparatus for processing such cylinders typically inject the egg white material and egg yolk material through a cylindrical cooking element or coaxial set of cooking elements during cooking, or alternatively mould the two sections separately during cooking and thereafter join the egg white and egg yolk together. During these processes preservatives may be added to the cylindrical or tubular egg product. Although the resulting cylindrical egg product does not itself resemble a natural egg, when sliced the resulting wafers of egg product do resemble a natural egg that has been sliced through the yolk.

Apparatus has also been developed for moulding and cooking egg white in cup shapes which also may be used in salads, as devilled eggs or the like. These cup-shaped egg whites do not include a yolk and only provide a hemispherical portion of a normal egg shape.

It is believed that heretofore shelled eggs have not been commercially processed or cooked by automated means so as to retain their normal oval egg shape. Previously, in order to cook eggs so as to retain their normal oval egg shape, at least in large numbers, the eggs were boiled or otherwise cooked in their shell and thereafter the shell peeled from the cooked egg. Peeling a cooked egg is a much more difficult and time-consuming process than cracking open and emptying an egg while in its uncooked state. Further, due to the inability or difficulty in mixing preservatives with an egg white in its shell, the preservation and storage of such hard boiled eggs pose difficulties.

Another problem that has been experienced with the boiling of fresh eggs is that if the egg has not aged sufficiently the cooked egg white adheres to the inside of the shell. The egg is then very difficult to peel and normally results in excessive tearing of the egg white exterior, which is deleterious to the acceptability of the cooked egg. Further, when freshly laid eggs are cooked at boiling water temperatures, quite often the exterior of the eggs acquire a pock-marked appearance. Freshly-laid eggs are therefore either aged somewhat prior to cooking or are not normally cooked in such a manner as to retain their normal oval egg shape.

Still another problem experienced by the egg industry is the natural production of large numbers of medium or small eggs. Although smaller eggs are not defective from a food value standpoint, eggs which are smaller than the standard large grade are not as desirable to consumers and therefore command a lower price. Thus, large quantities of medium or small eggs are more difficult to market than large eggs.

It is an object of the present invention to provide an apparatus and method by which a cooked egg product is produced having a normal oval egg shape. According to one aspect of the invention, an apparatus for cooking egg products is characterised by: a selectively openable and closable mould having at least one substantially egg-shaped mould cavity; means for filling the mould cavity with egg material; means for heating the mould; means for opening the mould and removing cooked egg product from the mould cavity; and means for transporting the mould from the filling means to the heating means and from the heating means to the opening and removing means, whereby the apparatus fills the mould cavity with egg material, cooks the egg material and removes the cooked egg material from the mould cavity to produce a cooked, substantially egg-shaped egg product.

According to a second aspect of the invention, a method of cooking egg-shaped egg products is characterised by: providing a cooking mould with an egg-shaped mould cavity therein, said mould having a selectively closable access opening large enough to permit the introduction of a whole egg yolk therethrough and a fill port through the mould to said egg-shaped cavity; introducing an egg yolk and egg white into the egg-shaped mould cavity; substantially filling to a preselected uniform volume said egg-shaped mould cavity with egg white through the fill port; cooking the egg yolk and the egg white in the egg-shaped mould; and removing the cooked egg yolk and the egg white from the mould.

According to a third aspect of the invention, a method of cooling an egg-shaped egg product comprising providing a selectively closable mould and means for cooking material in said mould, introducing an egg yolk and egg white into said mould, and cooking the egg yolk and the egg white in the mould, is characterised in that cooking takes

place at a temperature of approximately 85°C for a time period of between 25 and 30 minutes.

The invention also includes, according to a further aspect, a mould for cooking egg products which is characterised by at least three closely abutting mould sections each having an arcuate cavity forming surface thereon that cooperatively define an egg-shaped cavity, and an inlet port through at least one said section opening into the egg-shaped cavity.

According to a fifth aspect of the invention, a cooked egg product comprising an egg-shaped cooked egg white exterior and a discrete cooked egg yolk disposed within said egg white exterior is characterised in that the cooked egg white exterior has an overall size substantially equal to the size of a large egg, and the cooked egg yolk has a size substantially equal to the size of a medium egg yolk or a small egg yolk, whereby the cooked egg product has a higher ratio of egg white to egg yolk than that of a natural large egg.

Other features of the invention are referred to in the subsidiary claims but salient aspects and preferred features of the invention will now be discussed.

In accordance with the preferred methods of carrying out the invention, egg white material and an egg yolk material are placed in a multiple-section mould, which is then conveyed through a cooking oven. The apparatus provides a series of stations through which the mould is transported and at which various different processing steps are performed. The apparatus stations include an egg cracking and mould filling or topping off station, a cooking station, a cooked egg removal station and a mould cleaning station. Preferably a series of moulds are conveyed continuously through these stations for the automated production of cooked egg products each having a natural oval egg shape.

Preferably the mould includes three sections that cooperate to define a plurality of egg-shaped cavities. The three sections include at least one opening joint that abuts at the widest diameter of the egg in order to permit the cooked egg to be removed when this joint is opened. With the three sections in a stacked relationship, a top section may be cracked open to release any pressure within the mould, a middle section used to support and convey the mould between stations and a lower section may be pivoted downwardly from the middle section in order to permit the cooked egg product to fall out of the mould.

In the egg cooking method, either a shelled egg or egg white and an egg yolk are introduced into the mould. Additional egg white is introduced into the mould until the egg product reaches a uniform volume. In alternative preferred embodiments, preservatives or other ingredients are mixed with the egg white prior to cooking. Preferably, the egg product is cooked at temperatures ranging around the preferred temperature of one hundred eighty-five degrees Fahrenheit. The egg product is cooked at the preferred temperature for a time ranging around approximately twenty-five to thirty minutes. In one preferred embodiment a freshly laid egg is used in the cooking process.

With the apparatus and method cooked egg products having a normal oval egg shape are produced by automated processes. Preservatives or other ingredients may be added during processing while retaining the egg shape. The apparatus and method produce uniform volume egg products, so that consumer or retail specifications can be closely maintained. The process may be used with medium or small eggs as starting materials, yet yield a cooked egg product having the volume of a standard large grade egg, thus providing an economical use for less desirable small or medium grade eggs. Since an egg yolk contains a high level of cholesterol, through the use of a small or medium egg as a starting material, a large size egg can be produced with a lower than normal cholesterol level. Further, eggs may be cooked immediately after laying yet produce an egg product having an aesthetically pleasing exterior without pock-marking. Still further, egg products may be produced which have the yolk replaced with other edible materials, by replacing the yolk filling step with a step in which another edible material is dropped into the mould.

The invention may be carried into practice in various ways but one form of egg cooking apparatus embodying the invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a front elevational view of the apparatus;

Fig. 2 is a fragmentary, perspective view of egg product cooking moulds used in the apparatus of Fig. 1, with one mouldshown in a partially open condition;

Fig. 3 is a schematic front view of a linked series of egg product cooking moulds being conveyed through various processing stations of the apparatus shown in Fig. 1;

Fig. 4 is a front elevational view of an egg mould used in the apparatus of Fig. 1, shown in a closed condition;

Fig. 5 is a front elevational view of the egg mould of Fig. 4, shown in a partially open condition;

Fig. 6 is a fragmentary end elevational view of a closed mould taken in the region of arrow VI in Fig. 2;

Fig. 7 is a fragmentary sectional rear view of a mould cleaning apparatus taken in the region of arrow VII in Fig. 1;

Fig. 8 is a fragmentary, front elevational view of the mould cleaning apparatus of Fig. 7;

Fig. 9 is a fragmentary, front schematic view of a linked series of egg product cooking moulds being conveyed through the cooked egg product removal station and cleaning station of the apparatus shown in Fig. 1;

Fig. 10 is a top plan view of the apparatus shown in Fig. 1 in conjunction with additional handling equipment;

Fig. 11 is a fragmentary, front elevational view of the mould filling station taken in the region of arrow XI in Fig. 1, and taken along plane XI-XI of Fig. 13;

Fig. 12 is a front elevational view of a mould

filling valve used in the mould filling station of Fig. 11;

Fig. 13 is a fragmentary, end sectional view taken along plane XIII-XIII in Fig. 11;

Fig. 14 is a fragmentary, end sectional view of a topping-off valve used in the mould filling station of Fig. 11;

Fig. 15 is a fragmentary end elevational view of the cam and lever shifting assembly used with the mould filling station, taken in the region of arrow XV in Fig. 11;

Fig. 16 is a fragmentary perspective view of one end of the cam and lever shifting assembly of Fig. 15;

Fig. 17 is a front elevational view of a lateral shift cam used in the cam and level shifting assembly of Fig. 15;

Fig. 18 is a front elevational view of a vertical shift cam used in the cam and lever shifting assembly of Fig. 15;

Fig. 19 is a front elevational view of a mould opening cam used in the cam and lever shifting assembly of Fig. 15; and

Fig. 20 is a schematic rear view of the drive linkage for the cam and lever shifting assembly of Fig. 15.

The invention is preferably embodied in an apparatus and method for cooking egg product shown in Fig. 1 and referenced generally by the numeral 10. Apparatus 10 includes a series of processing stations through which a series of egg cooking moulds 12 (Fig. 2) are conveyed. As shown in Fig. 1, the egg processing stations include an egg cracking and mould filling station 14, an egg product cooking station 16, a cooked egg product removal station 18 and a mould cleaning station 20. The series of moulds 12 are continuously conveyed through these stations to automatically process the egg product.

As shown in Figs. 2, 4 and 5, each mould 12 is made up of three elongated bars that form an upper mould section 30, a middle mould section 32 and bottom mould section 34. Each mould 12 preferably contains fourteen mould cavities 36 (Fig. 2), each of which extends into or through all three mould sections 30-34. Alternatively, each mould 12 may have greater or lesser number of mould cavities, depending upon the length of mould 12 and the spacing of cavities 36. As shown in Figs. 4 and 5, each mould cavity 36 is configured in a natural egg-shaped oval. The narrower or more pointed end of cavity 36 extends into bottom mould section 34 while the more rounded or blunt end of cavity 36 extends into upper mould section 30. Cavity 36 therefore opens through middle mould section 32.

Mould sections 30-34 are pivotally joined by a set of hinges 38. Each hinge 38 has three brackets that are each secured to one of mould sections 30-34, so that all three mould sections may be pivotally separated as shown in Fig. 5. Bottom mould section 34 and middle mould section 32 have abutting surfaces 40 (Fig. 5) that closely mate to form a smooth transition for mould cavities 36. Abutting surfaces 40 are located at the greatest diameter of mould cavities 36. This positioning of surfaces 40 produces a circular opening through abutting surfaces 40 that is as large as the largest generally horizontal diameter of the egg product formed within mould 12. This permits cooked egg product to be removed from mould 12 by separating middle mould section 32 and bottom mould 34 and permitting the cooked egg product to drop out of the mould cavities 36 at abutting surfaces 40.

Upper mould section 30 and middle mould section 32 have abutting surfaces 42 (Fig. 5) that closely mate to form a smooth transition for mould cavities 36 between mould sections 30 and 32. Abutting surfaces 42 are located at a position on mould cavities 36 above surfaces 40 so as to produce a smaller diameter circular opening that is still sufficiently large to permit the passage of a normal large grade egg yoke. With middle and bottom mould sections 32, 34 closed and upper mould section 30 open, a whole egg yoke may be dropped through the opening at abutting surfaces 42.

Although abutting surfaces 42 may be positioned at various heights along mould cavities 36, it is preferred that abutting surfaces 42 be positioned as high as possible on cavities 36 while still maintaining a circular opening of sufficient size to permit the passage of a natural egg yoke. The higher the location of abutting surfaces 42 on mould cavities 36, the greater the percentage of mould cavity 36 that will lie below abutting surfaces 42 and therefore the greater the amount of egg material that may be poured into mould cavities 36 prior to closing upper mould section 30. Abutting surfaces 40 are preferably located roughly at the mid-point of the mould cavities 36. Two narrow fill ports 44 (Figs. 4, 5) open through the top of upper mould section 30. Fill ports 44 are used to top off mould cavities 36 as described below. Fill ports 44 are of sufficiently narrow diameter that fill ports 44 may remain open during cooking. Alternatively ports 44 may be closed by a suitable closure elements such as a sliding plate or the like (not shown) that operates in the manner of a gate valve. Moulds 12 are either coated or made of stainless steel to conform to food preparation health requirements. Cavities 36 may alternatively be coated by a release agent, such as Teflon brand coating.

Moulds 12 are conveyed between egg cracking and mould filling station 14, removal station 18 and cleaning station 20 along a frame 50 (Fig. 1). As shown in Fig. 2, moulds 12 are joined together to form a conveyor-like assembly that is conveyed along an upper support 52 on frame 50 and a lower support 54. Both upper and lower supports 52, 54 include horizontal beams 56 that are secured to supporting legs and a base in conventional fashion. Moulds 12 are joined together on either end by a link chain 60. Since the ends of each mould 12 are mirror images of each other, only one end of mould 12 and one end of upper and lower support 52 and 54 are hereinafter described. Upper support 52 and lower support 54 are similar with the exception of location and any specific differences hereinafter noted.

A guide plate 62 (Fig. 2) extends along the lower length of each horizontal beam 56 on upper supports 52 and is welded or otherwise suitably

secured to beam 56. A metal tracking pad 64 extends along the upper surface of guide plate 62. Chain 60 seats on tracking pad 64 which causes chain 60 and hence moulds 12 to track properly along the length of frame 50 as moulds 12 are conveyed along machine 10. Another guide plate 66 projects inwardly beneath guide plate 62 and is spaced slightly below and inwardly of guide plate 62 by an "L" shaped spacing bar 68. Guide plate 66 provides a support surface for a cylindrical roller follower 70 that is mounted on bottom mould section 34. Roller follower 70 is mounted on bottom mould section 34 by a bracket 72 located immediately adjacent the end of bottom mould section 34. Roller follower 70 projects longitudinally past the end of bottom mould section 34 as shown in Fig. 6. Guide plate 66 maintains bottom mould section 34 in a closed condition as appropriate as mould 12 is transported through apparatus 10.

Middle mould section 32 is bolted or otherwise secured to a pivot block 74 (Figs. 2, 6). Projecting longitudinally outwardly from pivot block 74 opposite middle mould secton 32 are a spaced pair of cylindrical roller followers 76. Roller followers 76 are supported and roll along the upper surface of guide plate 62. Pivot block 74 is pivotally coupled by a pivot 78 to a mounting block 80. Pivot 78 is a self lubricating brass bushing or other suitable pivot that permits mounting block 80 and pivot block 74 to pivot freely relative to one another. Mounting block 80 is secured to chain 60 by two spaced link rods 82 (Fig. 2). Link rods 82 are posts protruding inwardly to one side of chain 60, which posts are received and secured in apertures in mounting block 80.

As chain 60 conveys mould 12 from lower support 54 up to and along upper support 52, chain 60 and mounting block 80 become inverted relative to mould 12. Pivot 78 permits pivot block 74 and hence mould 12 to remain in an upright orientation during this inversion. As shown in Fig. 2 and the upper region of Fig. 3, mould 12 is being conveyed along upper support 52 and therefore mounting block 80 is positioned side by side with pivot block 74. Tracking pad 64 is relatively short in order to accommodate this positioning of mounting block 80. As shown in Fig. 6 and the lower region of Fig. 3, mould 12 is being conveyed along lower support 54. Mounting block 80 therefore overlaps but projects upwardly from pivot block 74. Tracking pad 64 therefore has a greater height along lower support 54 in order to accommodate this orientation of mounting block 80.

As shown in Fig. 2, a roller follower 84 is mounted on the end of upper mould section 30 by a mounting bracket 86. Roller follower 84 projects longitudinally past the end of upper mould section 30 to a location directly above roller follower 70 (Fig. 6). Roller follower 84 is brought into contact with camming surfaces at various locations within apparatus 10 in order to either hold upper mould section 30 in a closed condition or to open upper mould section as hereinafter described. As shown in Fig. 6, both upper mould section 30 and bottom mould section 34 are shorter than middle mould section 32. This provides clearance between roller followers 70 and 84 and pivot block 74. Camming surfaces may therefore access roller followers 70 and 84 without interference from pivot block 74.

Secured adjacent to each end of mould 12 is a latching assembly 87 (Figs. 2, 6). Each latch assembly 87 includes a notched plate 88 connected to middle mould section 32. Notched plate 88 projects above and depends below middle mould section 32 so that the notches lie adjacent to upper mould section 30 and bottom mould section 34. A spring loaded detent post 89 is mounted on each of mould sections 30 and 34 in order to engage the notches of notched plate 88. Spring loaded detent posts 89 hold mould sections 30 and 34 closed until a sufficient opening force is provided to overcome the detent spring force.

Shown in Fig. 11 is egg breaking and mould filling station 14. Egg breaking and mould filling station 14 is located at the upstream end of upper support 52. An end cog 100 is located at the end of frame 50 in order to raise moulds 12 from lower support 54 up to upper support 52.

At mould filling station 14 (Fig. 11) are an aligned row of fourteen mould filling valves 102 (Fig. 13), which are used to initially introduce an egg yolk and egg white material into mould cavities 36 of open moulds 12. The filling valves 102 are mounted on a carriage plate 104 that extends the width of apparatus 10. Each filling valve 102 is a rectangular downspout-like housing having a recessed lower surface 106 (Fig. 12). Lower surfaces 106 seat on abutting surface 42 of middle mould section 32 when mould 12 is an open condition in order to maintain alignment of seated valves 102 and mould 12 during filling. A ramped trough 108 funnels into the upper end of each filling valve 102. Ramped trough 108 opens downwardly into a fill port 110 (Fig. 12) that opens downwardly through filling valve 102. A single common valve stem 112 (Fig. 13) extends through all filling valves 102 Valve stem 112 includes valve openings therethrough (not shown) that when aligned with fill ports 110 permit the passage of egg materials through filling valves 102. On the protruding ends of valve stem 112 are pinion gears 114 (Fig. 12). Pinion gears 114 are used in a rack and pinion actuator assembly for the operation of filling valves 102. A rack 116 (Fig. 11) engages each pinion 112. Rack 116 is reciprocated by a pneumatic cylinder 118. Alternatively, pneumatic cylinder 118 could be hydraulic or a mechanical actuator. Pneumatic cylinder 118 is mounted on a side bracket 120. Side bracket 120 is in turn welded on carriage plate 104 for movement therewith.

An egg breaking machine 122 (Fig. 1) is located adjacent the end of frame 50. Egg breaking machine 122 shells natural eggs and ejects the egg white and egg yolk materials through an outlet trough 124 (Fig. 13). Outlet trough 124 has a fluted lower surface that funnels the egg contents out over troughs 108 on filling valves 102. Fill troughs 108 have an elongated upper opening so as to be located beneath outlet trough 124 even though filling valves 102 are moved laterally relative to egg cracking machine 122. One suitable egg breaking machine is manufactured by Seymour Foods Incorporated, P.O. Box 1220, Topeka, Kansas 66601, and

marketed under the trade name of Seymour Egg Breaker-Separator System, Model 104-B. Other suitable egg cracking machines or methods may be used in order to supply egg white material and egg yolks at mould filling station 14.

A trailing carriage plate 128 (Fig. 11) is connected to side brackets 120 downstream of carriage plate 104. A topping-off valve assembly 130 is mounted beneath carriage plate 128. Topping-off valve assembly 130 includes a set of fill brackets 132 that depend to a seating block 134. Seating block 134 seats flush on top of upper mould section 30 when mould 12 is in a closed condition. Topping off lines 136 extend out of seating block 134. Topping lines are connected to an egg white material supply with a conventional pump assembly (not shown) in order to inject egg white material through openings in seating block 134 and fill ports 44 of upper mould section 30. Seating block 134 may also alternatively include a level sensor probe (not shown) that depends from seating block 134 to be inserted down through a fill port 44 in order to determine when mould cavity 36 has been filled to a preselected fill level.

Shown in Fig. 14 is a topping off valve 138 used in topping-off valve assembly 130. Topping off valve 138 includes a valve body 140 having a series of inlet ports 142 that open into a series of spherical holding cavities 144. A series of outlets 146 open out of holding cavities 144. A common valve stem 148 extends through all mould cavities 144. Valve stem 148 has enlarged regions that selectively block valve inlets 142 and valve outlets 146. A pneumatic cylinder 150 is connected to valve stem 148 in order to linearly reciprocate valve stem 148. An egg white supply is pumped to supply egg white through inlets 142 to holding cavities 144 while valve stem 148 is shifted to an inlet condition with valve inlets 142 opened and valve outlets 146 closed off. When valve stem 148 is linearly shifted, the enlarged regions of stem 148 close off valve inlets 142 and open outlets 146. Egg white contained within valve cavities 144 is thus permitted to flow out through outlets 146 through fill lines 136 into egg cavities 36. Topping-off valve 138 is utilized when a preselected volume of egg white is to be added to mould cavities 36. Other alternative topping-off valve assemblies may be utilized, such as when a level sensor probe is used to control the filling of egg cavities 36.

Carriage plates 104 and 128 with side brackets 118 form a rigid carriage assembly that is used to shift filling valves 102 and topping off valve assembly 130 along with moulds 12 at mould filling station 14. Filling valves 102 and topping off valve assembly 130 are seated on top of separate moulds at 12 and shifted laterally as moulds 12 are conveyed during the filling operation. Thereafter, the overall carriage assembly is raised and returned back to its starting position for seating on another set of moulds 12 for filling.

The assembly used to shift the mould filling valve assembly along with the conveying of moulds 12 uses a cam arrangement (Figs. 11, 15, 16) to open moulds 12, and to raise and lower as well as laterally shift the valves. As shown in Fig. 11, a lateral guide rod 140a is mounted on either end of carriage plates 104, 128. A pair of bearings 142a coupled to carriage plates 104, 128 slidably receive each lateral guide rod 140 so that the mould filling valve assembly may slide laterally freely along guide rods 140. A pair of vertical guide rods 144a are mounted on each upper horizontal beam 56. Vertical guide rods 144a are spaced in order to accommodate lateral guide rods 140a therebetween. A sliding bearing 146a is connected to each end of lateral guide rods 140a and each receive a vertical guide rod 144a. Bearings 146a permit lateral guide rods 140a to be raised and lowered freely along vertical guide rods 144a.

Located toward the downstream end of egg cracking and mould filling station 14 are a pair of mounting panels 150 (Fig. 11) welded to the sides of horizontal beams 56. Mounted on the upstream end of mould filling station 14 are a pair of a shorter mounting panels 152. As shown in Fig. 16, a drive axle 154 is mounted by pillow blocks 156 on mounting panels 150a. A fixed upper axle 158 is secured between mounting panels 150a. Upper axle 158 is spaced above and to the upstream side of drive axle 154. A fixed lower axle 160 is mounted between mounting panels 150a directly beneath upper axle 158 and spaced below drive axle 154.

Shown in Fig. 16 is one side of the cam assembly used to shift the mould filling valve assembly. Since the two sides of the cam assembly are mirror images of each other (Fig. 15), only one side is described below. A lateral shift lever 170 is used to laterally reciprocated the mould filling valve assembly with the conveying of moulds 12. Lateral shift lever 170 is pivotally mounted by a bearing 172 to upper axle 158. A lateral shift cam 174 is keyed or otherwise suitably mounted on drive axle 154 in order to rotate therewith. A roller follower 176 on lateral shift lever 170 contacts cam 174 in order to move lever 170 with the rotation of cam 174. Lateral shift lever 170 includes a notched lower region 178 (Fig. 16) that provides clearance about lower axle 160, and lateral shift lever 170 depends beneath lower axle 160. An adjustable length linkage 180 (Fig. 11) couples the lower end of lateral shift lever 170 to side bracket 120. Thus, as lateral shift cam 174 rotates, side brackets 120 are slid laterally along guide rods 140a.

A vertical shift lever 190 (Fig. 16) is used to raise and lower the mould filling valve assembly onto moulds 12. Vertical shift lever 190 is coupled by a bearing 192 to lower axle 160. A vertical shift cam 194 is keyed or otherwise suitably coupled to drive axle 154 in order to rotate therewith. A roller follower 196 on vertical shift lever 190 contacts cam 194. Vertical shift lever 190 therefore pivots with the rotation of vertical shift cam 194. A roughly triangular vertical shift bracket 198 (Fig. 11) is mounted on each of mounting panels 150 and 152. Each bracket 198 is mounted by appropriate bearings on a short mounting axle 200 at one corner of bracket 198. Vertical shift brackets 198 are linked together at their upper corners by a tie rod 202. The downstream vertical shift bracket 198 is linked to the upper end of vertical shift lever 190 by an adjustable length linkage 204. The pivoting of lever 190 therefore simultaneously pivots both vertical shift brackets

198. The lower corner of each vertical shift bracket 198 is coupled to one of sliding bearings 146a by a linkage 206 having an adjustable length. So linked, lateral guide rod 140 raise and lower along vertical guide rods 144a as vertical shift brackets 198 are pivoted.

A mould opening lever 210 (Fig. 16) is pivotally mounted by a bearing 212 to lower axle 160. A mould opening cam 214 is keyed or otherwise suitably coupled to drive axle 154 for rotation therewith. A roller follower 216 on mould opening lever 210 contacts and tracks mould opening cam 214. A kicker lever 218 (Fig. 11) through a suitable bearing is pivotally mounted on mounting panel 152 by a cantilevered cam lever axle 220 (Fig. 13). Kicker lever 218 extends upwardly above axle 220 as well as depending down to the mould conveying region about end cog 100. The lower end of kicker lever 218 is angled into a contact surface 222. Contact surface 222 is sloped and positioned in order to contact roller follower 84 on upper mould sections 30 when lever 218 is pivoted. A tie rod 222a (Fig. 11) couples the upper end of mould opening lever 210 with the upper end of kicker lever 218. In operation, as mould opening lever 210 is shifted by cam 214, kicker lever 218 pivots to contact roller follower 84 and kick open upper mould section 30 as mould 12 enters mould filling station 14. A cam closing surface 224 (Fig. 11) is mounted between filling valves 102 and topping off valve assembly 130 on horizontal beam 56. Cam closing surface 224 is located so as to contact roller follower 84 of opened upper mould section 30 in order to force upper mould section 30 closed as mould 12 travels in the direction of arrow A prior to reaching topping off valves assembly 130.

A preferred configuration for lateral shift cam 174 is shown in Fig. 18, while a preferred configuration for vertical shift cam 194 is shown in Fig. 17 and a preferred configuration for mould opening cam 214 is shown in Fig. 19. Shown schematically in Fig. 20, a drive gear 230 is coupled to a suitable drive motor (not shown) used to drive both drive gear 230 and end cog 100. Drive gear 230 is coupled through a set of reducer gears 232 to gear 234 on drive axle 154. Cams 174, 194 and 214 are suitably clamped or otherwise coupled to appropriate mounting blocks or the like keyed onto drive axle 154.

Cams 174, 194 and 214 are configured so that as mould 12 enters mould filling station 14, mould opening lever 210 is shifted, causing kicker lever 218 to kick open upper mould section 30. Side brackets 120 are laterally shifted along lateral guide rods 140a to an upstream position. Vertical shift lever 190 is pivoted by vertical shift cam 194, causing vertical shift brackets 198 to lower lateral guide rods 140a along vertical guide rods 144a. Mould filling valves 102 are thereby lowered down onto an open mould 12 while topping-off valve assembly 130 is lowered onto a closed mould 12 further downstream. As end cog 100 turns lateral shift cam 174 pivots lateral shift lever 170 in order to shift side brackets 120 simultaneously with the conveying of moulds 12. During this shifting procedure, egg materials are introduced into open mould 12 through valves 102 and egg white material is injected to top off closed mould 12 through topping-off valve assembly 130. Thereafter vertical shift cam 184 pivots vertical shift lever 190 in order to raise lateral guide rod 140a, followed by lateral shift lever 170 ret-urning side brackets 120 along rods 140a to a starting position for lowering onto a new set of moulds 12.

Cooking station 16 includes an oven 240 through which filled moulds 12 are conveyed for cooking. Oven 240 includes a series of direction changing cogs or gears 242 that produce a serpentine or zigzag path for moulds 12 through oven 240. Each mould 12 is thus raised and lowered along this serpentine path while the pivoting connection to chains 60 maintain moulds 12 in an upright orientation. After passing through the vertical serpentine path moulds 12 are conveyed along the bottom of oven 240 back to egg product removal station 18.

Oven 240 is maintained at a preferred temperature ranging around 82.2°C to 85°C (180°F to 185°F). Egg product conveyed through oven 240 is therefore cooked at a temperature lower than the normal boiling point of water. This cooking temperature preferably has a maximum preferred temperature level in the vicinity of about 85°C to 86.1°C (185°F to 187°F). The egg product is cooked in oven 240 for a time period ranging preferably between about twenty-five to thirty minutes. The speed that moulds 12 are conveyed through oven 240 as well as the number and spacing of cogs 240 may be adjusted in order to accommodate this cooking time period, the egg product being preferably cooked for a much longer time period than for normal hard boiled eggs. When a freshly laid egg is cooked at this low temperature and longer time period, a cooked egg product having a smooth outer surface is produced. It is believed that when freshly laid eggs are cooked at temperatures in excess of the preferred maximum temperature pock marking will result on the surface of the egg. With the preferred cooking time and temperature it is most preferred that a freshly laid egg be used. Alternatively however eggs having been laid several hours or days previously may also be satisfactorily utilized in the cooking method.

Egg product removal station 18 is shown in Fig. 9 and includes a camming plate 260 mounted beneath each lower support 54. Camming plate 260 has a camming surface 262 that provides a guide track for roller follower 70 on bottom mould section 34. Camming surface 262 extends under an unlatching cam surface 263 located near the entrance to removal station 18. Unlatching cam surface 263contacts the upper edge of roller follower 70 in order to force follower 70 downwardly and unlatch latching assembly 87. Camming surface 262 curves downwardly to a trough region 264 that causes bottom mould section 34 to drop open. Trough region 264 has a smoothly curved, generally V-shaped configuration that causes bottom mould section 34 to pivot downwardly and then pivotally invert as mould 12 advances in the direction of arrow B in Fig. 9.

A chill bath 266 is located beneath trough region 264 and extends the width of apparatus 10. Chill bath 266 is positioned so that cooked egg product in mould 12 will drop out of mould cavities 36 and fall into chilled water or other suitable cooling solution in

bath 266 as bottom mould section 34 is pivotedly lowered. Located in bath 266 are a series of conveyor rollers 268 that form a roller conveyor. Conveyor rollers 268 are scalloped into smoothly reduced diameter regions spaced along their length in order to provide curved recesses 270. Curved recesses 270 cradle the cooked egg product as the egg product is rolled along conveyor rollers 268 and thereby reduce damage to the exterior surface of the cooked egg product. A suitable roller conveyor drive (not shown) turns rollers 268 to convey the cooked egg product.

An upper camming surface 280 (Fig. 9) is located above camming surface 262 and unlatching cam surface 263. Upper camming surface 280 is located just prior to the start of trough region 264. Upper camming surface 280 is located so as to contact roller follower 84 on upper mould section 30 and thereby raise open upper mould section 30. Upper camming surface 280 cracks open upper mould section 30 in order to release the vacuum within mould cavities 36, thus permitting the cooked egg product to drop freely out of mould 12 as bottom mould section 34 is pivoted downwardly.

A beam 290 extends from camming plate 260 in order to form a continuation of camming surface 262 that leads into mould cleaning station 20. Beam 290 is positioned in order to hold bottom mould section 24 in a sloped semi-inverted orientation shown in Fig. 9. Beam 290 extend into a lowered beam section 292. Lowered beam section 292 ramps downwardly in order to cause bottom mould sections 34 to drop downwardly toward a vertical orientation at the end of mould cleaning station 20.

The mould cleaning apparatus is shown in Figs. 7 and 8. A vertically spaced pair of horizontal support rods 300 are mounted on either side of apparatus 10 to extend between vertical legs of frame 50. A generally horizontal carriage bar 302 is mounted on each support rod 300 by a pair of sliding bearings 304 (Fig. 8). An angled guide rod 306 is secured between upper and lower carriage bars 302, and a vertical guide rod 308 is also secured between upper and lower carriage bars 302 downstream of angled guide rod 306. Carriage bars 302 as joined by angled guide rod 306 and vertical guide rod 308 form a rigid carriage on each side of apparatus 10 that slides along support rods 300. A pneumatic cylinder 310 coupled to lower carriage bar 302 laterally reciprocates carriage bars 302 and guide bars 306, 308 along support rods 300. Cylinder 310 advances the cleaning assembly along with the conveying of moulds 12 during the cleaning operation.

On each end of apparatus 10 a mounting plate 320 (Figs. 7, 8) is slidably mounted on angled guide rod 306 by a pair of bearings 322. Beams 323 (Fig. 7) extend the width of apparatus 10 to join mounting plates 320 and form a rigid carriage that slides along angled guide rods 306. This rigid carriage is used to advance and retract cleaning utensils relative to open moulds 12. A suitable cleaning drive motor 324 is mounted on mounting plate 320 on one side of apparatus 10. A pair of cleaning drive gears 326 and a pinion gear 328 are mounted on mounting plate 320 in order to be driven by motor 324 through a drive chain 330 (Fig. 8). Extending substantially the width of apparatus 10 between mounting plates 320 are a laterally spaced pair of angled rectangular brush housings 332. A brush drive axle 334 is connected to each drive gear 326 to extend within housings 332. Suitable bearings on axles 334 allow axles 334 to be driven by motor 324. Spaced along each axle 334 are sloped gears 336. Sloped gears 336 provide right angle transmission to a series of brush drive shafts 338. Brush drive shafts 338 are mounted by suitable bearings 340 and protrude out of housings 332. Drive shafts 338 are aligned with cavities 36 of an adjacent mould 12, so that fourteen drive shafts 338 are carried on each axle 334. A brush head 342 is located on the end of each drive shaft 338. Brushes 342 each have a curved surface that mates with an egg cavity 36 for insertion during cleaning of mould cavities 36. A pneumatic cylinder 344 coupled between each mounting plate 320 and lower carriage bar 302 reciprocates the cleaning assembly on mounting plate 320 in order to advance brushes 342 into the bottom mould sections of two adjacent open moulds 12.

A mounting plate 350 is mounted by a pair of sliding bearings 352 on each vertical guide rod 308. Reinforcing beams 353 extend between the two mounting plates 352 in order to form a rigid assembly. A suitable cleaning drive motor 354 is mounted on one mounting plate (Fig. 7) along with a pair of brush drive gears 356 and pinion gear 358. Motor 354 drives brush drive gears 356 through a drive chain 360.

Extending between mounting plates 350 are a pair of brush housings 362 (Fig. 7). Extending within housings 362 are a pair of brush drive axles 364 which are coupled to brush drive gears 356. Spaced along drive axles 364 are sloped gears 366 that turn a spaced set of brush drive shafts 368. Brush drive shafts 368 are mounted by bearings 370 on housings 362 in order to freely rotate, and each drive shaft 268 includes a brush head 372 at its upper end. Brushes 372 are shaped to be matingly inserted into cavities 36 of an adjacent mould 12. A pneumatic cylinder 374 couples mounting plate 350 to lower carriage bars 302. Cylinder 374 raises and lowers brushes 372 into and out of upper mould sections 30 and middle mould sections 32 of an adjacent mould 12 when bottom mould section 34 is in an open condition.

As shown in Fig. 9, a top closing cam surface 378 extends along the upper edge of cleaning station 20. Cam surface 378 is positioned to contact roller followers 84 on upper mould sections 30 in order to hold upper mould sections 30 closed during cleaning.

As a cleaning cycle is commenced, cylinder 310 draws the cleaning assembly toward the downstream end of cleaning station 20. Housings 332 are thus positioned at locations 332A and 332B of Fig. 9. As the cleaning cycle commences, cylinder 344 raises mounting plates 320 along angled guide rods 306 in order to advance housings 332 to positions 332A' and 332B,. At these raised positions brushes 342 have been inserted into cavities 36 on two adjacent moulds 12. A steam jet (not shown) located

adjacent to each brush 342 sprays into cavity 36 on lower mould section 34 as brushes 342 are turned. Simultaneously cylinders 374 raise mounting plates 350 so that housings 362 are shifted from positions 362A and 362B to raised positions 362A'and 362B'. In these raised positions, brushes 372 are inserted into cavities 36 of upper mould section 30 and middle mould section 32. Steam jets (not shown) positioned adjacent each brush 372 spray cavities 36 as brushes 372 are turned. While brushes 342 and 372 are turning to clean cavities 36, cylinder 310 advances the cleaning assembly simultaneously with the advancement of moulds 12. When the cleaning process has been completed, housings 332 have been shifted to positions 332B' and 332C', while housings 362 have been shifted to positions 362B' and 362C, (Fig. 9). Cylinders 344 and 374 there retract or lower mounting plates 320 and 350 away from moulds 12. Cylinder 310 then returns the cleaning assembly to the starting position for another cycle.

Since each axle 338 and 368 is provided with a cavity cleaning brush, two adjacent lower mould sections 34 are simultaneously cleaned and thereafter these adjacent moulds 12 are advanced for the simultaneous cleaning of upper and middle mould sections 30, 32. Alternatively, the forward set of cleaning drive shafts 338 on mounting plate 320 and the forward set of cleaning drive shafts 368 on mounting plates 350 may be fitted with semi-resilient rubber or plastic scraping utensil heads. In this scraping embodiment, each set of drive shafts must access every mould in order to first scrape and then brush mould cavities 36.

A mould closing cylinder 390 is mounted at the end of mould cleaning station 20 (Fig. 9). Mould closing cylinder 390 is mounted by a pair of mounting rods 392 to lower support 54. Mould closing cylinder 390 raises and lowers a curved closing surface 394. Curved closing surface 394 is positioned to contact roller follower 70 on bottom mould section 34 after follower 70 has been conveyed off lower beam section 392. Cylinder 290 is secured to a pair of mounting plates 396 that extend between mounting rods 392. A pair of guide rods 398 depend from closing surface 394 and slidably extend through appropriate bearings in mounting plates 396. As mould 12 is conveyed over cylinder 390, closing surface 394 is raised in order to contact follower 70 and pivot bottom mould section 34 until latch assembly 87 closes.

The manner in which moulds 12 are conveyed through apparatus 10 is shown in Fig. 3. As shown in Fig. 3, moulds 12 are conveyed through filling station 14. As shown in the upper right region of the figure, as mould 12 passes over end cog 100, bottom mould section 34 is closed while upper mould section 30 is opened by kicker 218. In the region of arrow C, an egg yolk and egg white are poured into middle and bottom mould sections 32, 34. Upper mould section 30 is then closed by cam closing surface 224. In the region of the arrow D egg white is injected through ports 44 in order to top off the mould cavities 36. Moulds 12 continue to be conveyed in the direction of arrow A into oven 240 for cooking. As moulds 12 exit oven 240, upper mould section 30 is cracked open slightly by upper camming surface 280 and bottom mould section 34 is slowly dropped and substantially inverted in order to dump the cooked egg product. Moulds 12 continue to be conveyed in the direction of arrow B into cleaning station 20, whereat brushes 342 and 372 clean bottom mould section 34 and closed upper and middle mould sections 30, 32, respectively. Moulds 12 are then conveyed up around end cog 100.

A suitable set of controls of conventional design sequentially activate the cleaning apparatus and mould filling apparatus as well as control the speed that moulds 12 are conveyed through cooking station 16.

With the described cooking method, the cholesterol level of the cooked egg product may be changed while still producing an egg product having the volume of that of a normal large grade egg. To vary the cholesterol, either a small or medium grade egg white and egg yolk are deposited into a mould cavity 36. Additional egg white is injected into the enclosed mould cavity until the volume of a natural large grade egg is reached. The reduction in size of the egg yolk relative to the volume of egg white thus varies the cholesterol level as required. By reducing the size of the yolk the cholesteral level of a large grade egg may be reduced by approximately one third.

Preservatives may also be mixed with the egg white or egg yolk preparatory to cooking. Preservative agents of various suitable types may be used which permit the cooked egg product to be frozen for storage and transport. Other ingredients may also be mixed in with the egg white, egg yolk or both as desired.

As shown in Fig. 10, a conveyor 400 transports eggs to egg cracking machine 122. Egg yolks and egg white are dumped into moulds at valve troughs 108 while moulds are topped off with egg white at topping off valve assembly 130. Thereafter moulds 12 are conveyed through oven 240 by motor drive 402 coupled to cogs 242. When the cooked egg product is dumped into chill bath 266, the egg product is passed through an inspection region 404 where the egg product is visually inspected for flaws. The cooked egg product is then transferred into a wash station 406 and thereafter to a drying and ultraviolet treatment region 408 along a conveyor. The egg product is then conveyed to various loading machines 410 that package the cooked egg products in egg cartons for stacking and transport.

It is to be understood that the above is a description of the preferred embodiments and one skilled in the art will recognize that various modifications or improvements may be made without departing from the invention.

Claims

1. An apparatus for cooking egg products, characterised by: a selectively openable and closable mould (12) having at least one sub-

stantially egg-shaped mould cavity (36); means (14) for filling the mould cavity with egg material; means (16) for heating the mould; means (18) for opening the mould and removing cooked egg product from the mould cavity; and means (60) for transporting the mould from the filling means (14) to the heating means (16) and from the heating means (16) to the opening and removing means (18), whereby the apparatus fills the mould cavity with egg material, cooks the egg material and removes the cooked egg material from the mould cavity to produce a cooked, substantially egg-shaped egg product.

2. Apparatus according to Claim 1 in which the said mould includes a plurality of the said cavities (36) therein.

3. Apparatus according to claim 1 or claim 2 which includes a plurality of said moulds (12), the transporting means (60) sequentially transporting the moulds.

4. Apparatus according to claim 3 in which each mould (12) includes a plurality of closely mating mould sections (30,32,34).

5. Apparatus according to any of claims 1 to 4 which includes means (20) for cleaning the or each cavity (36) when said cooked egg product is removed from the or each mould cavity.

6. Apparatus according to claim 5 in which the or each mould (12) includes a plurality of mould cavities (36); and the cleaning means (20) comprising a cleaning utensil (342,372) for each mould cavity, and means (374,344) for advancing the cleaning utensils into the mould cavities and withdrawing the cleaning utensils from the mould cavities.

7. Apparatus according to claim 6 in which the or each mould (12) includes a plurality of mould sections (30,32,34) and the cleaning means comprising a plurality of cleaning utensils for each said mould cavity, said cleaning utensils of each mould cavity being adapted for advancement into different ones of the mould sections.

8. Apparatus according to claim 6 or claim 7 in which the cleaning means comprises a scraping utensil and a brush utensil for each said mould cavity, said advancing and withdrawing means being adapted to first advance said scraping utensil into said mould cavity and the advance said brush utensil into said mould cavity.

9. Apparatus according to claim 8 in which the cleaning means comprises a first set of a first scraping utensil and a first brush utensil and a second set of a second scraping utensil and a second brush utensil for each mould cavity, the first set adapted for advancement into one of said mould sections and said second set adapted for advancement into another of said mould sections.

10. Apparatus according to any of claims 5 to 9 in which the transporting means sequentially transports the moulds from the opening and removing means (18) to the filling means (14); and the cleaning means (20) is adapted to move with the moulds for a predetermined distance between the opening and removing means and the filling means, and for cleaning the moulds while moving therewith.

11. Apparatus according to any of claims I to 10 in which the said filling means (14) is adapted to move with the mould or moulds (12) prior to arrival of the mould or moulds at the heating means for filling the moulds while moving therewith.

12. Apparatus according to any of claims I to 11 in which the heating means (16) includes an oven and the said transporting means (60) continuously transports the mould (12) through the oven.

13. Apparatus according to any of claims 1 to 12 in which the mould (12) has at least one upper mould section (30) and at least one lower mould section (34) and which includes means (84,280) for releasing pressure in the mould and means (70,264) for lowering the lower mould section (34) sufficiently to provide cooked egg product therein with the ability to drop out of the mould cavity.

14. Apparatus according to claim 13 in which the lowering means is adapted for pivoting said lower mould section (34) downwardly to a location at which the cooked egg product drops out of said lower mould section.

15. Apparatus according to claim 13 or claim 14 in which the upper mould section (30,32) and said lower mould section (34) closely mate at the greatest substantially horizontal diameter of the mould cavity.

16. Apparatus according to any of claims 13 to 14 which includes a conveying track along which the transporting means convey the mould, and a cam surface (262) disposed to extend proximate the conveying track, the mould (12) having a follower (70) therein coupled to the lower mould section (34) and engaging the cam surface, the cam surface being configured to pivotally lower the lower mould section through the first follower as the mould is transported along the conveying track.

17. Apparatus according to claim 16 in which the upper mould sectional has a mould body (32) and a mould cover 32) therein and in which there is a second cam surface (280) disposed to extend proximate the conveying track, the mould having a second follower (84) thereon coupled to the mould cover and engaging the second cam surface, the second cam surface being configured to raise the mould cover through the second follower and thereby relieve pressure within the mould cavity prior to lowering of the lower mould section.

18. Apparatus according to any of claims 1 to 17 which includes a chill tank (266) disposed beneath the opening and removing means (18) and adapted to receive cooked egg product falling from the mould (12).

19. Apparatus according to claim 18 which includes means (268) for conveying cooked egg product disposed in the chill tank (266).

20. Apparatus according to claim 19 in which the cooked egg product conveying means includes a plurality of aligned rotating rods having thereon a plurality of regions with substantially smoothly curved reduced diameters (270).

21. Apparatus according to any of claims 1 to 20 in which the filling means (14) includes a fill chamber having means (106) for seating the fill chamber (108) on the mould (12), means (104,128,104a,174,170) for advancing the fill chamber (108) with said mould a predetermined distance between said opening and removing means and said heating means; and means (102) for the controlled dispensing of egg material from the fill chamber when the fill chamber is seated on said mould.

22. Apparatus according to claim 21 which includes means for introducing a controlled amount of excess egg material into said mould cavity.

23. Apparatus according to claim 21 or claim 22 in which the mould (12) has a mould cover (34) an a mould body (32,30) mating at an upper region of the mould cavity (36) to form an upper opening thereat when the mould is in an open condition, the mould cover having an excess egg port therethrough, the fill chamber mating with the upper opening, and which includes a fill nozzle having means for selectively coupling the fill nozzle to the excess egg port and coupled to the egg material supply.

24. Apparatus according to claim 23 in which the upper opening has a size sufficient to permit the passage of an egg yolk.

25. Apparatus according to any of claims 1 to 24 in which the or each mould (12) has an excess fill port that opens into said mould cavity, the mould filling assembly (14) is adapted to sequentially introduce the contents of a neutral egg into the mould cavities while the moulds are in an open condition, and the mould filling assembly (14) includes a secondary filling assembly that is adapted to sequentially introduce egg material into the mould cavities through the excess fill port.

26. Apparatus according to claim 25 in which the primary filling assembly and the secondary filling assembly are mounted on a common carriage, the mould filling assembly being adapted to move the carriage with the moulds a predetermined distance at the mould filling station.

27. Apparatus according to claim 26 in which the mould filling assembly includes means (200,198) for raising and lowering the carriage and means (174,170) for advancing and retracting said carriage.

28. Apparatus according to claim 27 in which the transport means (60) is coupled to a first cam (214) and a second cam (174), the means for raising and lowering the carriage including the first cam so as to be activated thereby, the means for advancing and retracting the carriage including the second cam so as to be activated thereby, whereby the first cam and the second cam are configured to raise and lower the primary filling assembly and the secondary filling assembly on successive moulds and advance therewith a predetermined distance.

29. A method of cooking egg-shaped egg products, characterised by: providing a cooking mould (12) with an egg-shaped mould cavity therein, said mould having a selectively closable access opening large enough to permit the introduction of a whole egg yolk therethrough and a fill port through the mould to said egg-shaped cavity; introducing an egg yolk and egg white into the egg-shaped mould cavity; substantially filling to a preselected uniform volume said egg-shaped mould cavity with egg white through the fill port; cooking the egg yolk and the egg white in the egg-shaped mould; and removing the cooked egg yolk and the egg white from the mould.

30. A method as claimed in claim 29 in which the cooking step includes cooking the egg yolk and the egg white at a temperature of approximately 85° C.

31. A method as claimed in claim 29 or claim 30 in which the cooking step includes cooking the egg yolk and the egg white for between 25 and 30 minutes.

32. A method according to any of claims 29 to 31 in which the introducing step includes introducing a freshly laid, shelled egg into the mould.

33. A method according to any of claims 29 to 32 in which the cooking step includes continuously conveying the mould through an oven.

34. A method according to any of claims 29 to 33 which includes continuously conveying the mould between a mould filling station, a cooking station, a removal station and a cleaning station at which the mould is cleaned.

35. A method according to claim 34 in which the cleaning step includes scraping the mould cavity and brushing the mould cavity.

36. A method according to any of claim 29 to 35 in which each mould has a mould body and a mating lower mould section with said lower mould section selectively lowerable relative said mould body, and the removing step includes lowering the lower mould section until the cooked egg yolk and egg white drops from the upper mould section.

37. A method according to claim 36 in which the removing step includes pivoting the lower mould section downwardly until the cooked egg yolk and egg white drops from the lower mould section.

38. A method according to any of claim 29 to 37 in which the introducing step includes introducing an egg yolk having a size less than the yolk size of a large egg into the mould cavity and filling the mould cavity to a volume substantially equal to that of a large egg.

39. A method of cooking an egg-shaped egg product, comprising providing a selectively closable mould and means for cooking material

in said mould, introducing an egg yolk and egg white into said mould, and cooking the egg yolk and the egg white in the moulds, characterised in that cooking takes place at temperature of approximately 85°C for a time period of between 25 and 30 minutes.

40. A method according to claim 39 in which cooking takes place at a temperature less than 86.I°C.

41. A method according to claim 39 or claim 40 in which the introducing step includes introducing a freshly laid, shelled egg into the mould.

42. A mould for cooking egg products characterised by at least three closely abutting mould section (30,32,34) each having an arcuate cavity forming surface thereon that cooperatively define an egg-shaped cavity (36), and an inlet port through at least one said section opening into the egg-shaped cavity.

43. A mould according to claim 42 in which the mould sections comprise a first mould section (34), a second mould section (32) and a third mould section (30), the second mould section being disposed between the first mould section and the third mould section, the egg-shaped cavity (36) extending from the first mould section through the second mould section to the third mould section, and the first mould section arcuate cavity forming surface and the third mould section arcuate cavity forming surface each defining an egg-shaped end of the egg-shaped cavity.

44. A mould according to claim 43 in which the mould sections are hingedly joined.

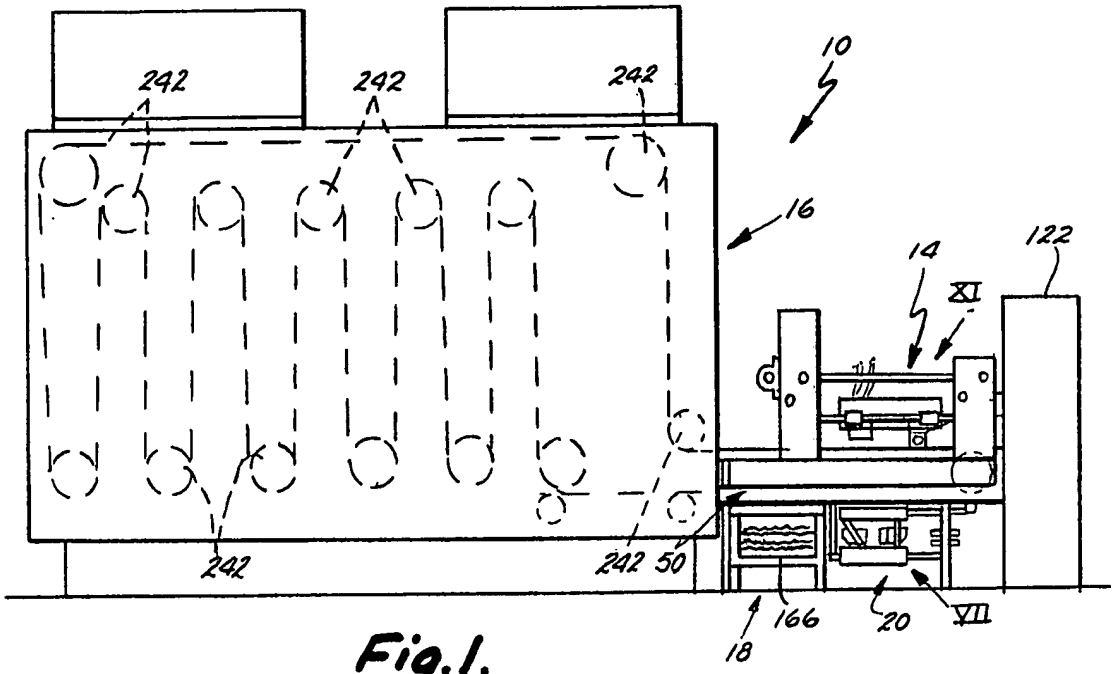
45. A mould according to claim 43 or claim 44 in which the egg-shaped cavity (36) has a blunt end and a narrowed end, and the third mould section (30) defines said narrowed end, and the inlet port extends through the third mould section.

46. A mould according to any of claims 43 to 45 in which the egg-shaped cavity has a longitudinal axis extending between the first mould section (34) and the third mould section (30), said egg-shaped cavity has a maximum diameter perpendicular to the longitudinal axis, and the first mould section (34) and said second mould section (32) matingly contact about at said maximum diameter.

47. A mould according to any of claims 42 to 46 which mould has a plurality of egg-shaped cavities (36) therein.

48. A cooked egg product comprising: an egg-shaped cooked egg white exterior and a discrete cooked egg yolk disposed within said egg white exterior; characterised in that the cooked egg white exterior has an overall size substantially equal to the size of a large egg, and the cooked egg yolk has a size substantially equal to the size of a medium egg yolk or a small egg yolk, whereby the cooked egg product has a higher ratio of egg white to egg yolk than that of a natural large egg.

49. A cooked egg product according to claim 48 which has a cholesterol level of less than about one third the cholesterol level of a natural egg.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VII
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Fig. 1.

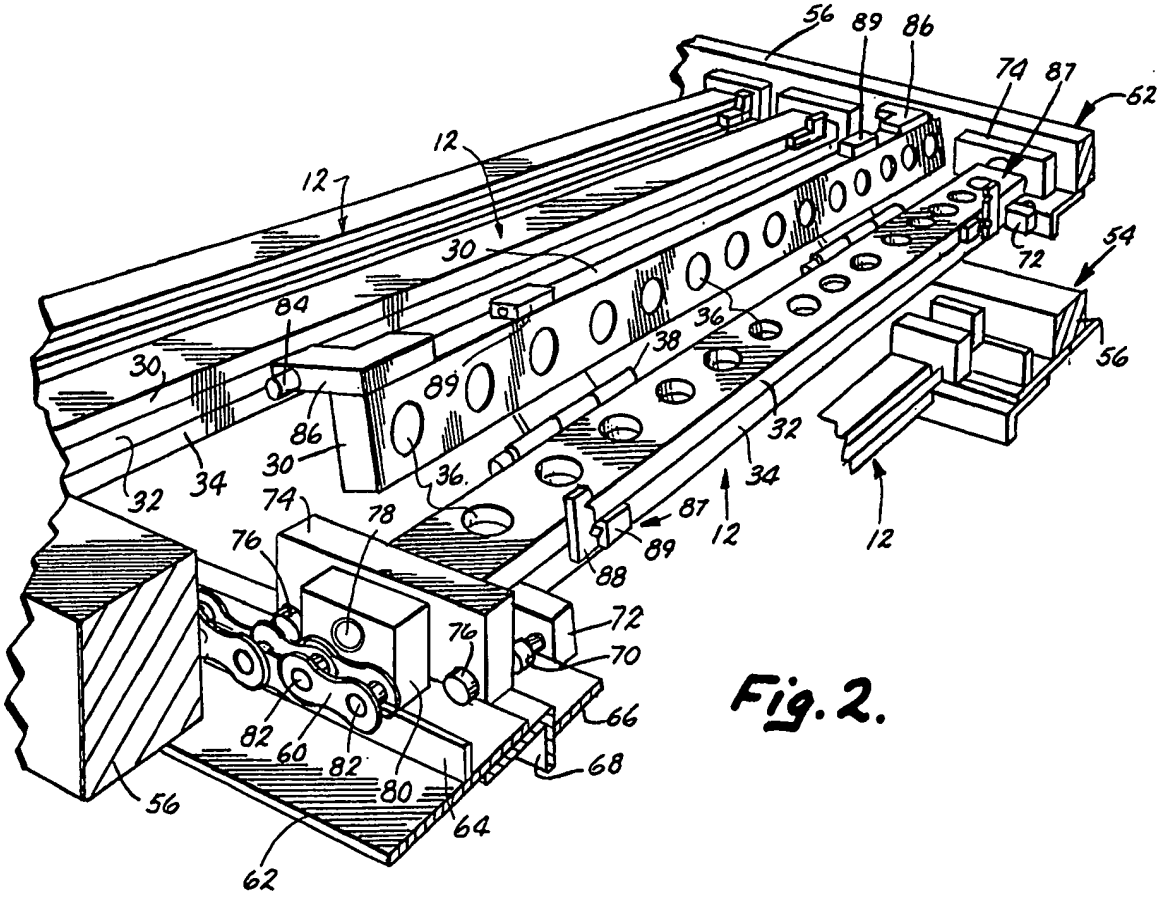
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Fig. 2.

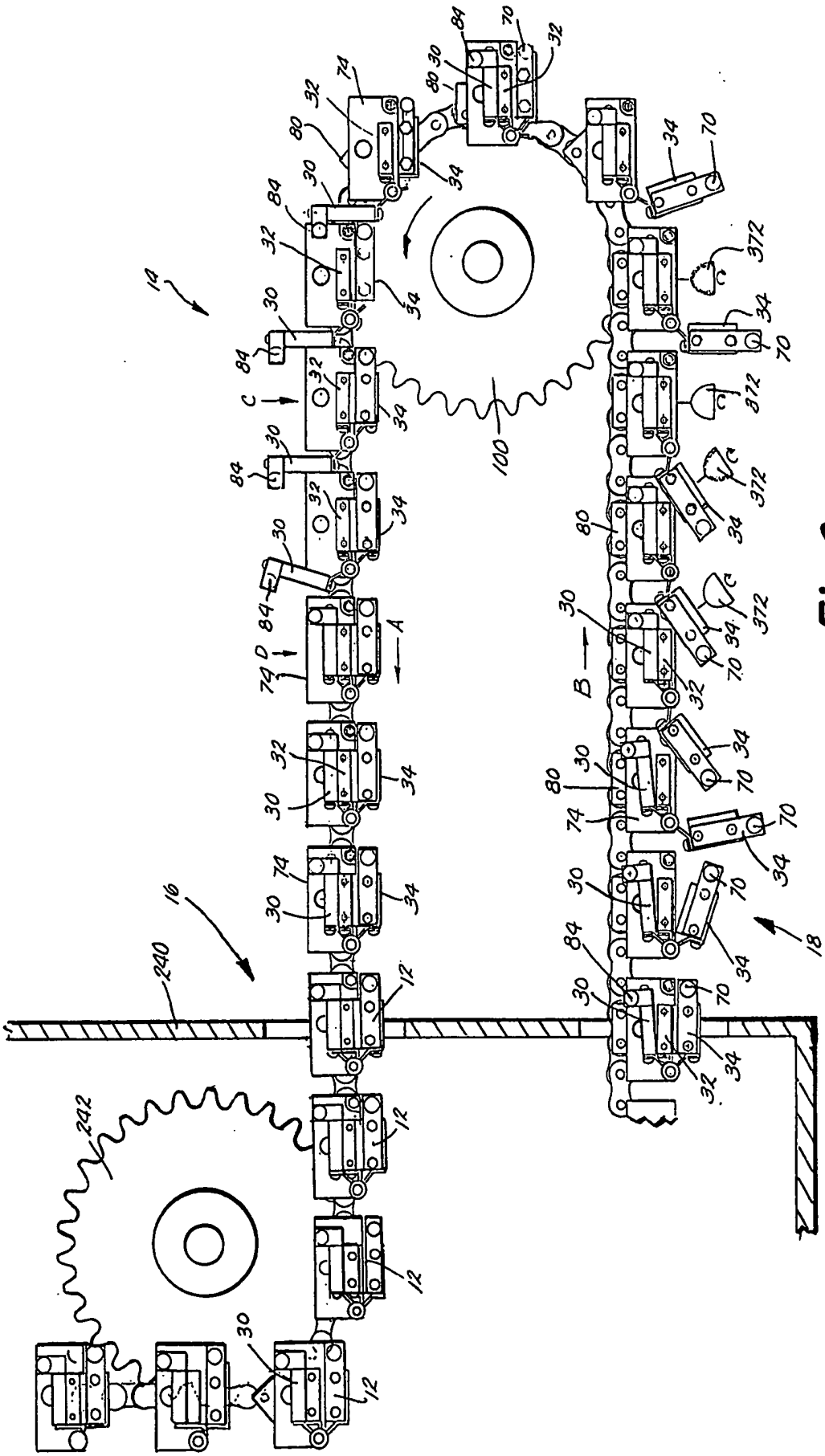

Fig. 3.

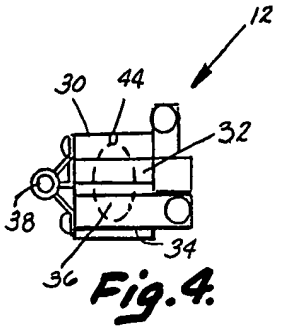

Fig.4.

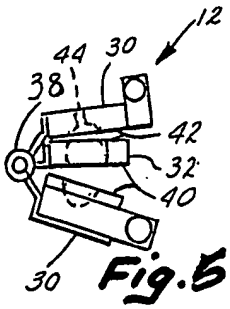

Fig.5

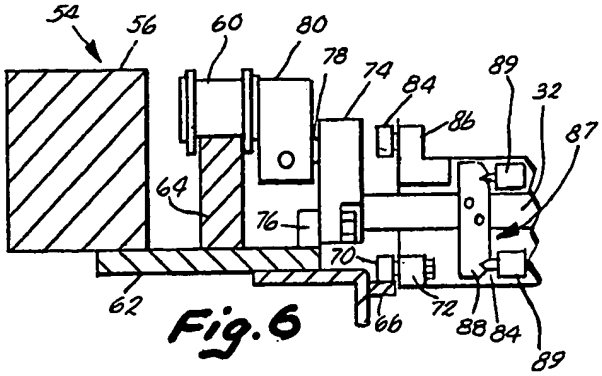

Fig.6

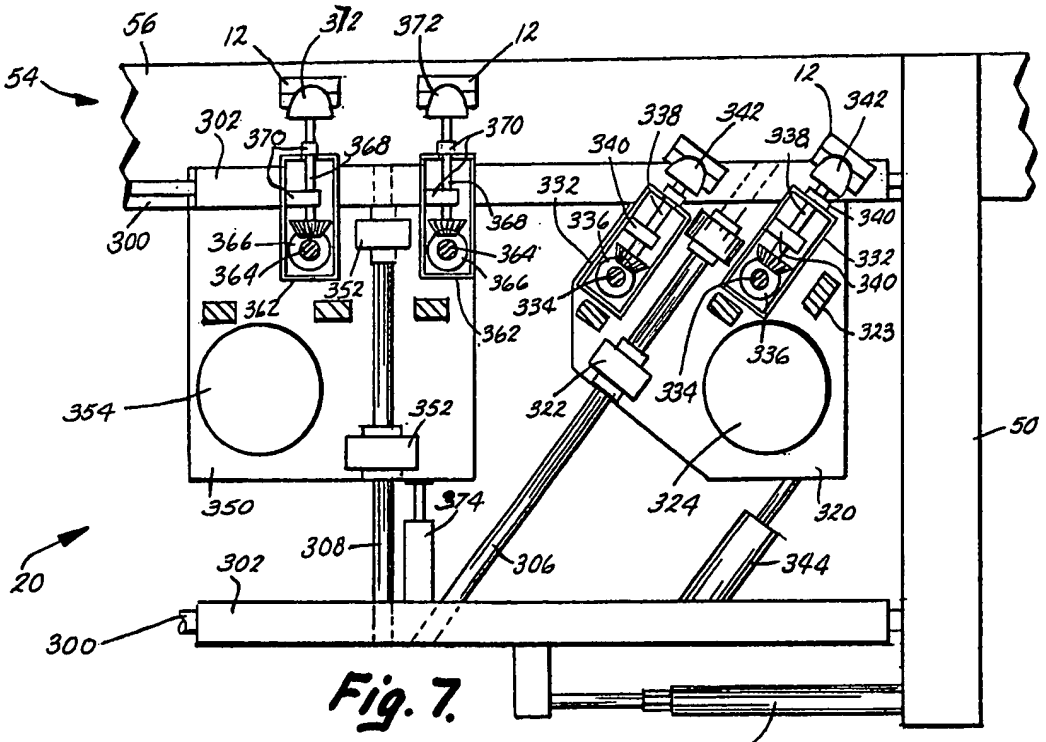

Fig. 7.

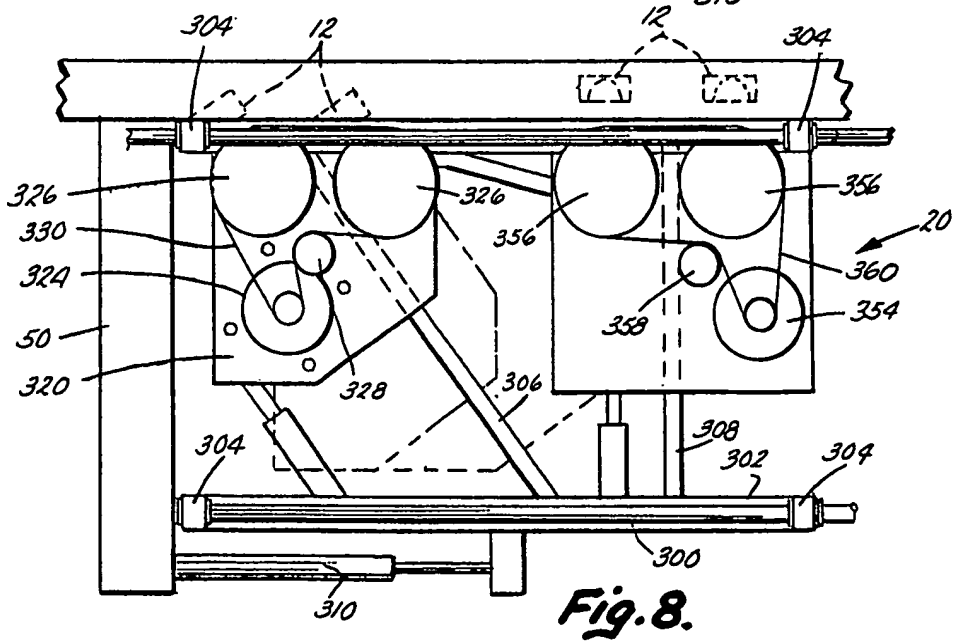

Fig. 8.

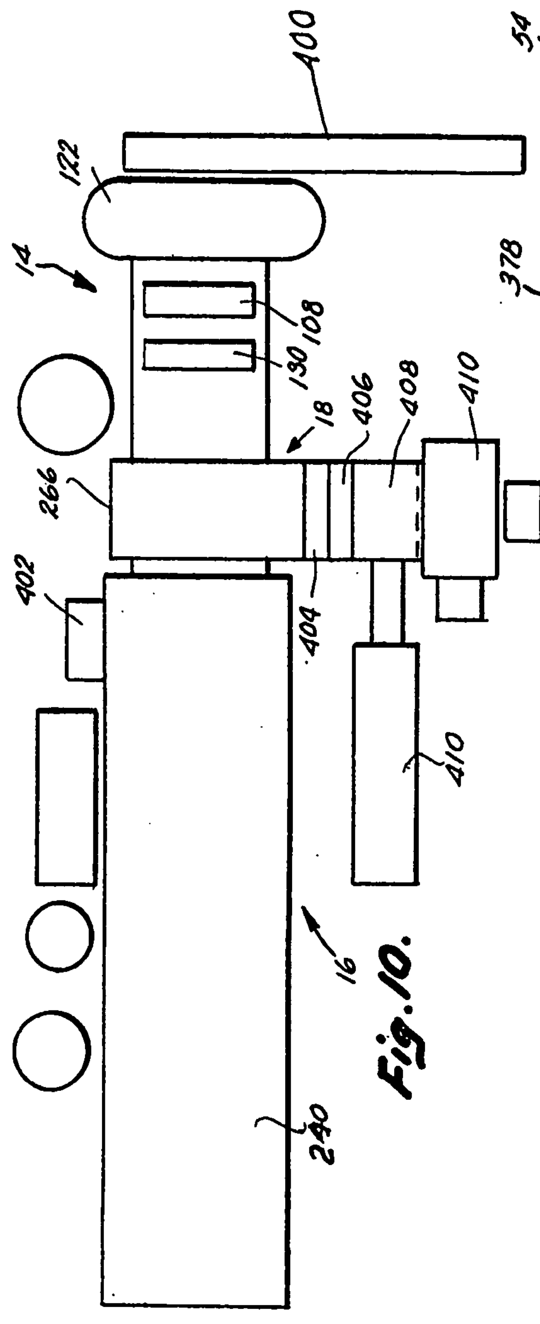
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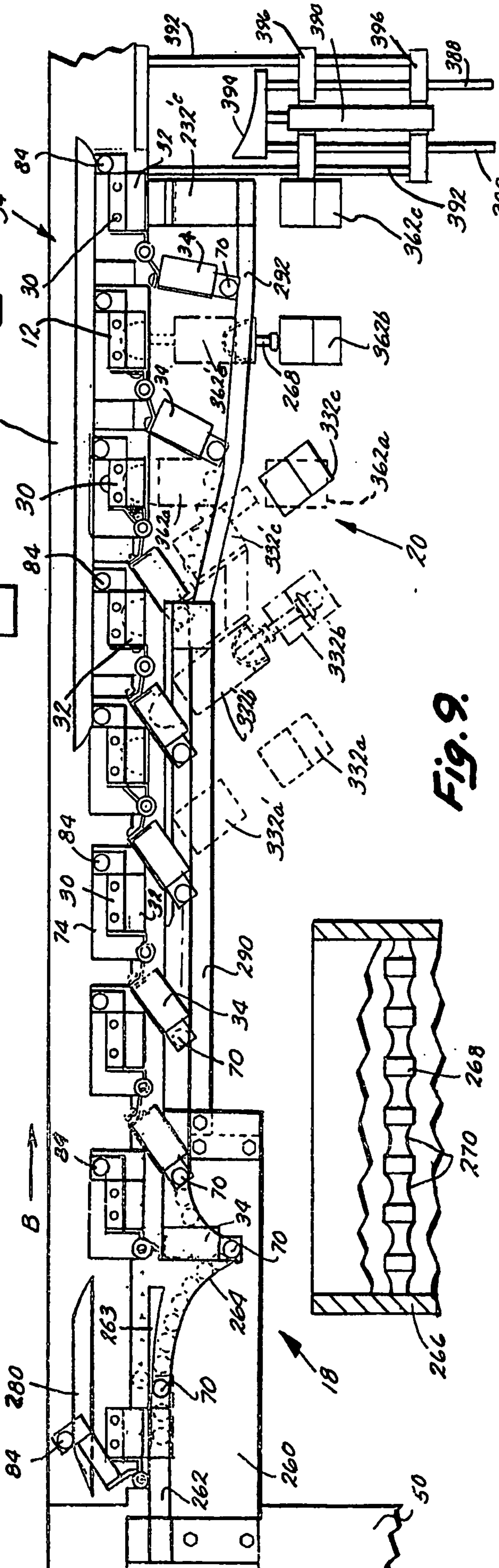
Fig.10.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392
362c
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362b
378
34
332c
362a
30
362a
332c
20
84
332b
332b
32
332b
332a
332a
84
30
74
32
290
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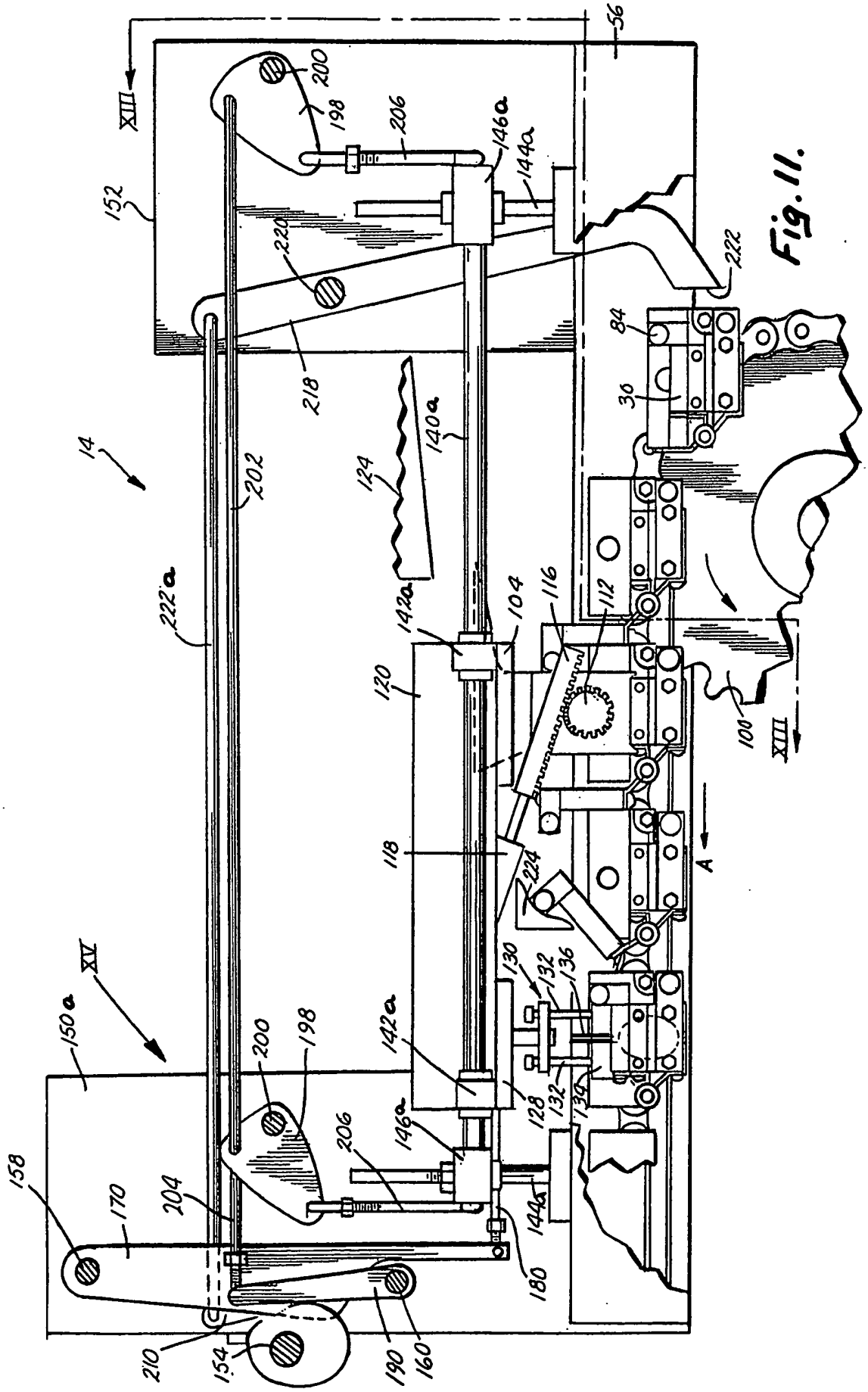
262
260
50

Fig.9.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36
14
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104
116
112
120
100
XIII
118
224
A
130
132
136
XV
150a
200
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160

Fig. 11.

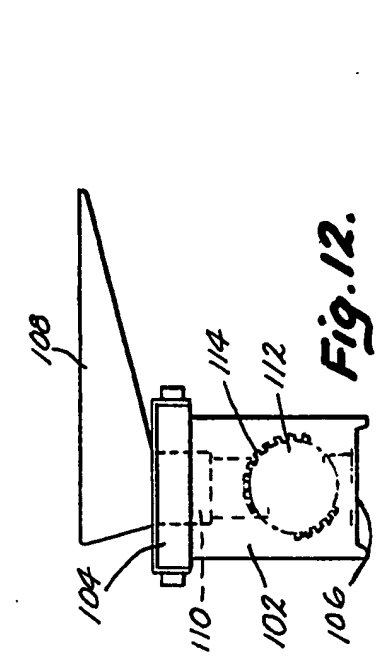

Fig.12.

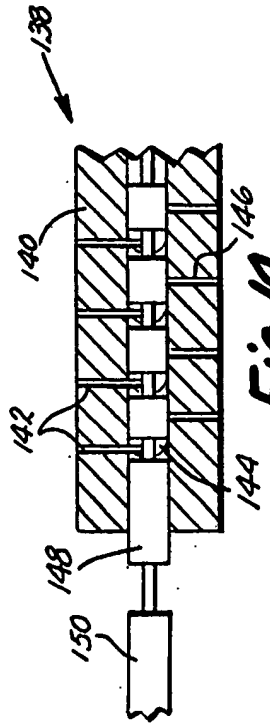

Fig.14.

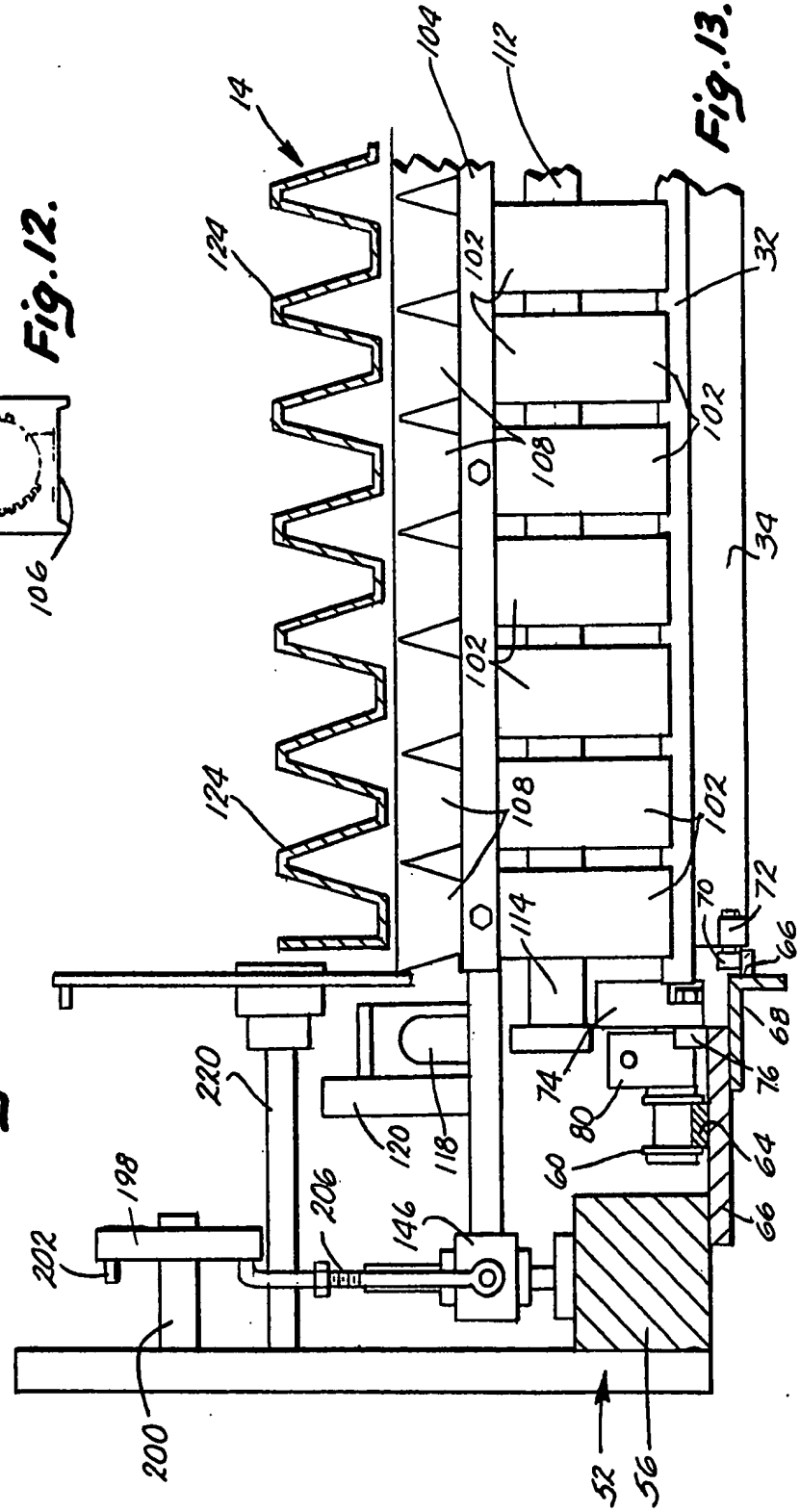

Fig.13.

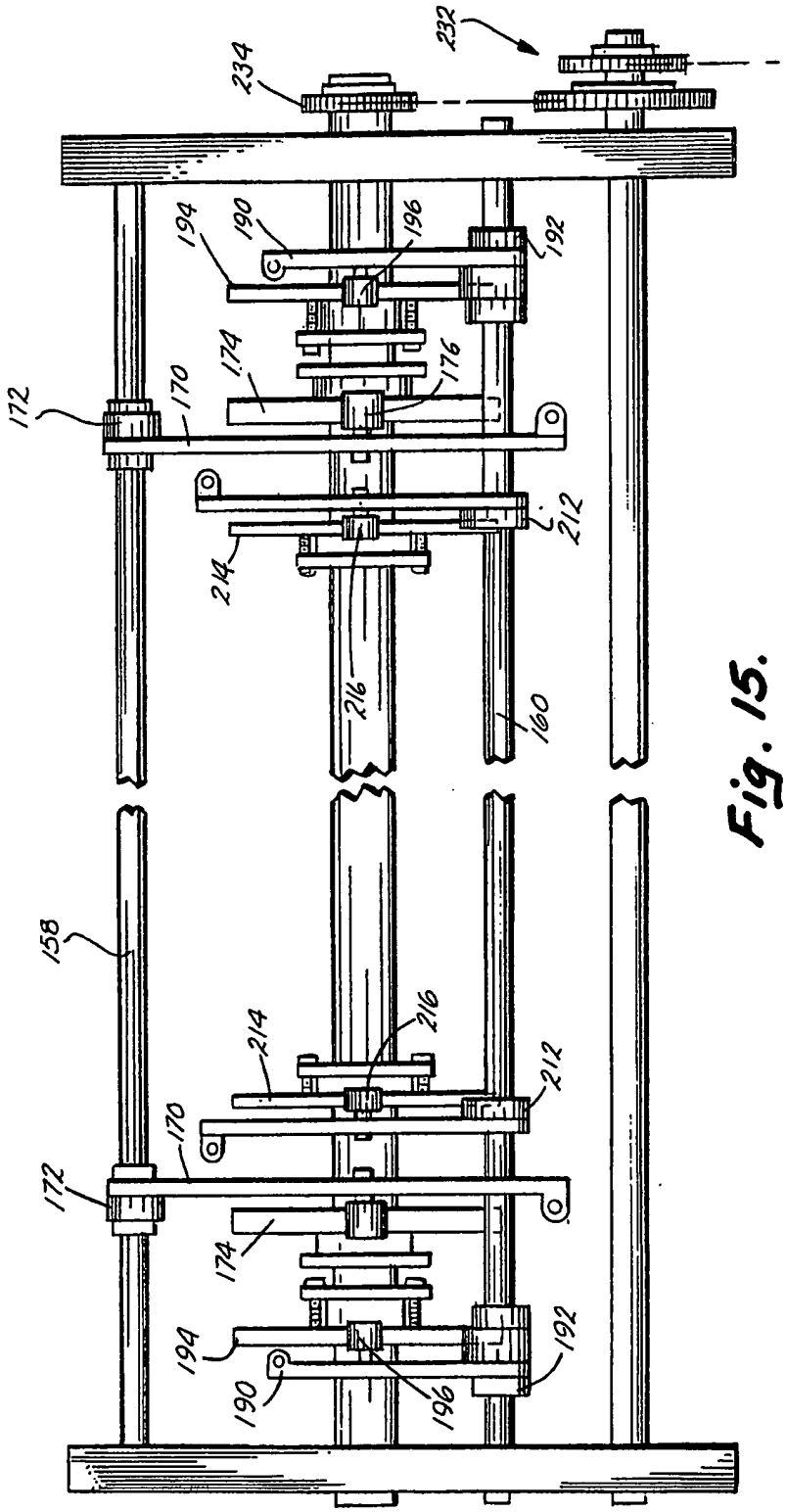

Fig. 15.

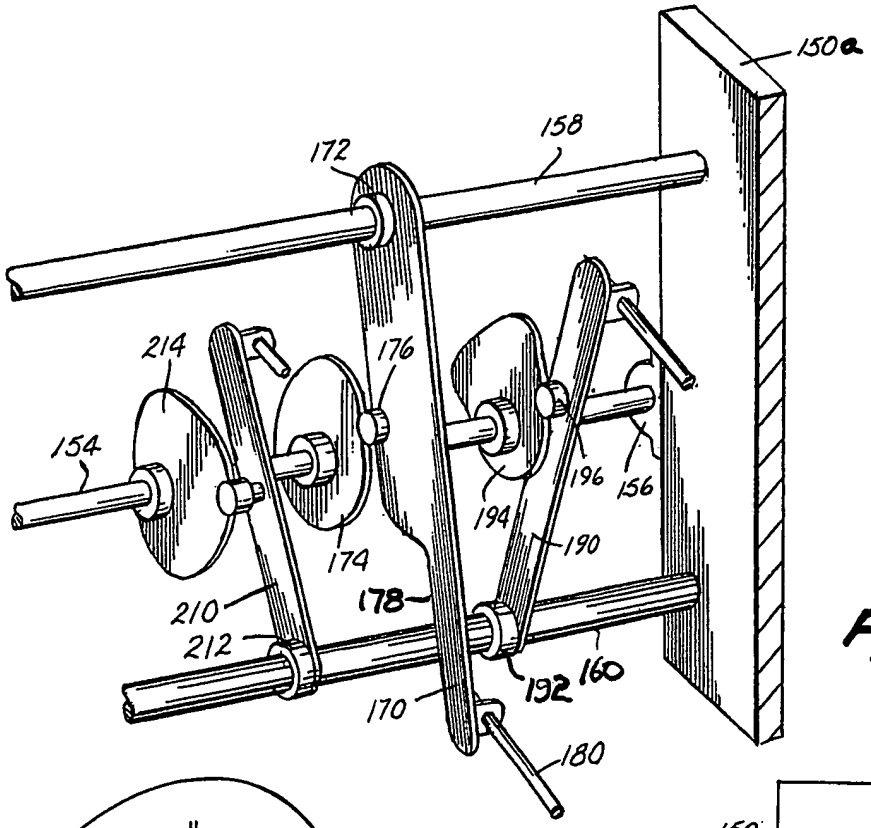

Fig. 16.

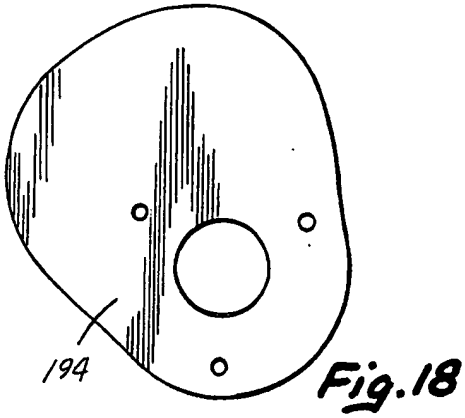

Fig. 18

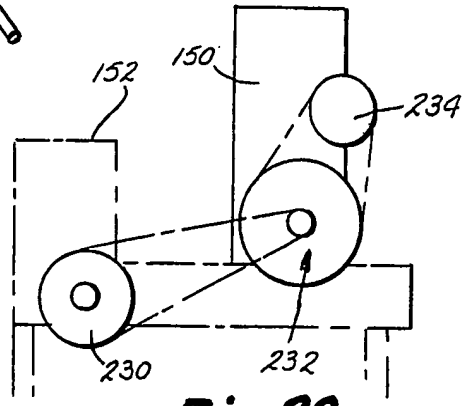

Fig. 20

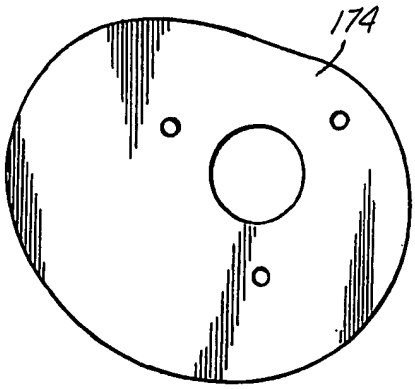

Fig. 17.

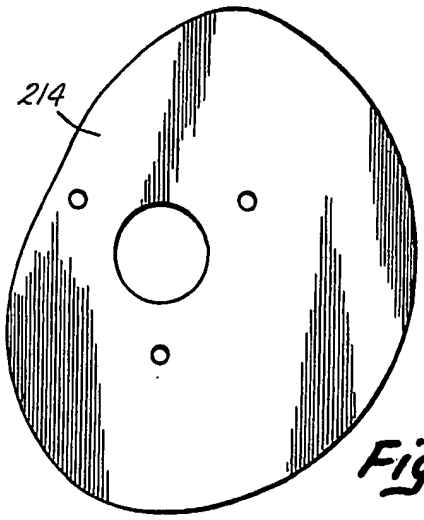

Fig. 19.

To, Theresa

From: Goldman, Philip
Sent: Monday, December 12, 2005 3:41 PM
To: To, Theresa
Subject: FW: Dermatrends Annuities

could you help me get a handle on exactly which cases she is referring to, and what correspondence, next steps, etc we may have on hand or yet to do in order to get an answer to her ? thanks

-----Original Message-----
From: Pavey, Rita
Sent: Monday, December 12, 2005 9:30 AM
To: Goldman, Philip
Cc: Thompson, Madelyn; To, Theresa
Subject: RE: Dermatrends Annuities

What is the status of this. The final deadlines for these annuities is fast approaching.

Thanks.
Rita

> -----Original Message-----
> **From:** Goldman, Philip
> **Sent:** Monday, November 28, 2005 11:22 AM
> **To:** Pavey, Rita
> **Cc:** Thompson, Madelyn; To, Theresa
> **Subject:** RE: Dermatrends Annuities
>
> There is a good chance the client is at its last stage with regard to funding options. I will ask the three of you to put together a summary letter regarding these particular cases, specifying the amounts we need for each, the deadlines, and requiring that they either provide the amounts by a certain date prior to the due date, or initial their agreement to let the cases go. Thanks
>
> > -----Original Message-----
> > **From:** Pavey, Rita
> > **Sent:** Monday, November 28, 2005 10:44 AM
> > **To:** Goldman, Philip
> > **Subject:** Dermatrends Annuities
> >
> > Reminder: I have not yet received any instructions regarding the Dermatrend annuities coming due in December. Please note that there are three European applications with a **final** deadline of December 20, 2005, and a number of annuities due December 15, 2005. What is the status of requesting prepayment from this client?
> >
> > Thanks.
> > Rita

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